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*Vocational Education

IDENTIFIERS *Ohio Competency Analysis Profiles

ABSTRACT

This competency analysis profile contains eight lists of mathematics skills that have been identified by employers and verified by math-certified instructors as being core competencies for eight groups of occupational areas. Each list is organized into subsections dealing with the following: numbers and number relations, measurement, data analysis and probability, algebra, and geometry. The following are among the broad categories of occupations included in the eight occupational groups: business, marketing, and law enforcement; agriculture and horticulture; agricultural and auto mechanics; building trades; allied health occupations; home economics-related, food service, and hospitality occupations; commercial and graphic arts; and technical occupations and machine trades. Also included in this competency analysis profile are cross-reference charts illustrating the correlation between the identified competencies and the Onio Model Competency-Based Mathematics Program. A copy of the Ohio Model Competency-Based Mathematics Program concludes the profile. (MN)

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OHIO'S COMPETENCY ANALYSIS PROFILE

MATHEMATICS

This OCAP contains eight core mathematics lists that correspond to forty-nine occupational areas, which have been divided into eight groups. The core competencies have been identified by employers and verified by math-certified instructors. Also included in this OCAP are cross-reference charts that show the correlation between these competencies and the Ohio Model Competency-Based Mathematics Program.

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This OCAP is divided into eight lists that correspond to the following groups of occupational areas.

Group A

Accounting
Administrative/Secretarial Services
Business Administration and Management
Business Information Systems
Entertainment Marketing
General Marketing
Law Enforcement
Travel and Tourism Marketing

Group B

Agricultural Business Feed and Grain Worker
Agricultural Production
Agricultural Products Sales and Service Worker
Animal Management Technician
Fertilizer/Chemical Sales and Service Worker
Floriculture and Greenhouse Worker
Forest Industry Worker
Horticulture
Natural Resource.
Nursery and Garden Center Worker
Resource Conservation
Turf and Landscape Worker

Group C

Agricultural/Industrial Mechanical
Technician
Auto Collision Technician
Auto Mechanics
Diesel Mechanics
Power Equipment Technology

Group D

Building and Property Maintenance
Carpentry
Heating, Ventilation, Air-Conditioning, and
Refrigeration
Masonry
Welding

Group E

Dental Assistant
Diversified Health Occupations
Medical Assistant
Nurse Aide
Practical Nursing

Group F

Clothing and Interiors, Production and Services
Cosmetology
Early Childhood Education and Care
Food Production, Management, and Services
Hospitality and Facility Care Services
Meat Processor

Group G

Commercial Art
Graphic Communications: Commercial
Photography
Graphic Communications: Graphic Arts

Group H

Drafting
Electrical Trades
Electronics
Industrial Maintenance
Machine Trades



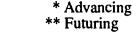
Ohio Competency Analysis Profile **Mathematics**

for

Accounting Administrative/Secretarial Services Business Administration and Management Business Information Systems Entertainment Marketing General Marketing Law Enforcement Travel and Tourism Marketing

Unit 1: Numbers and Number Relations Subunit 1.1: Group A

- Competency 1.1.1: Round and/or truncate numbers to designated place value
- Competency 1.1.2: Compute and solve problems involving integers, fractions, decimals, and percentages using order of operations
- Competency 1.1.3: Compare, order, and determine equivalence of real numbers (e.g., fractions, decimals, percentages)
- Competency 1.1.4: Estimate, apply, and solve problems involving fractions, decimals, percentages, and real numbers
- Set up, solve, and apply ratios and proportions Competency 1.1.5:
- Competency 1.1.6: Solve problems and make applications involving integers, fractions, decimals, percentages, ratios, and proportions
- Competency 1.1.7: Translate written and/or verbal statements into mathematical expressions
- Competency 1.1.8: Estimate answers



Unit 2: Measurement

Subunit 2.1: Group A

- Competency 2.1.1: Convert, compare, and compute with common units of measurement within and/or across measurement systems
- Competency 2.1.2: Compute using appropriate units of measurement
- Competency 2.1.3: Read scale on measurement device(s) to nearest mark and make interpolations where appropriate
- Competency 2.1.4: Estimate measurements

Unit 3: Data Analysis and Probability

Subunit 3.1: Group A

- Competency 3.1.1: Interpret and use tables, charts, maps, and/or graphs
- Competency 3.1.2: Identify patterns, note trends, and/or draw conclusions from tables, charts, maps, and/or graphs
- Competency 3.1.3: Collect and organize data into tables, charts, and/or graphs
- Competency 3.1.4: Compute and interpret mean, median, and/or mode
- Competency 3.1.5: Use elementary notions of probability
- Competency 3.1.6: Use problem-solving techniques

Unit 4: Algebra

Subunit 4.1: Group A

- Competency 4.1.1: Evaluate and/or simplify algebraic expressions using simple substitutions
- Competency 4.1.2: Solve linear equations
- Competency 4.1.3: Use order of operations to solve problems
- Competency 4.1.4: Use formulas
- Competency 4.1.5: Compare and compute using scientific notation*
- Competency 4.1.6: Use properties of exponents*



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Unit 5: Geometry Subunit 5.1: Group A

Competency 5.1.1: Find perimeters and areas of geometric figures

Find surface areas and volumes of applicable Competency 5.1.2:

geometric figures

Recognize, classify, and use properties of lines and Competency 5.1.3:

angles

Recognize, classify, and use properties of two- and three-dimensional figures (e.g., circles, triangles, rectangles, cylinders) Competency 5.1.4:

Competency 5.1.5: Apply Pythagorean theorem*







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Refer to pages 78-81 for Ohio Model Competency-Based Mathematics Program codes.



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Refer to pages 78-81 for Ohio Model Competency-Based Mathematics Program codes.

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Law Enforcement
Travel and Tourism Marketing

Ohio Model Competency: Based Mathematics OCAP OCAP OCAP 1.1.1 Ohio Model Competency: Based Mathematics 1.1.2 1.1.3 1.1.1 1.1.4 Properties Program 1.1.1 1.1.2 Properties Program 1.1.3 1.1.3 Properties Program 1.1.3 Properties Program Properties Program 1.1.3 Properties Program Properties Program 1.1.4 Properties Program Properties Program 1.1.3 Properties Program Properties Program 1.1.3 Properties Program Properties Program 1.1.6 Properties Program Properties Program 1.1.6 Properties Program Properties Program 1.1.6 Properties	F			-		r	1	_			_			_	ſ	_		_	1	_	1	_	ı
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Administrative/Secretarial Services
Business Administration and Management
Business Information Systems
Entertainment Marketing
General Marketing
Law Enforcement
Travel and Tourism Marketing

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Ohio Competency Analysis Profile **Mathematics**

for

Agricultural Business Feed and Grain Worker Agricultural Production Agricultural Products Sales and Service Worker Animal Management Technician Fertilizer/Chemical Sales and Service Worker Floriculture and Greenhouse Worker Forest Industry Worker Horticulture Natural Resources Nursery and Garden Center Worker Resource Conservation Turf and Landscape Worker

Unit 1: Numbers and Number Relations Subunit 1.2: Group B

- Competency 1.2.1: Round and/or truncate numbers to designated place value
- Competency 1.2.2: Compute and solve problems involving integers, fractions, decimals, and percentages using order of operations
- Competency 1.2.3: Compare, order, and determine equivalence of real numbers (e.g., fractions, decimals, percentages)
- Estimate, apply, and solve problems involving Competency 1.2.4: fractions, decimals, percentages, and real numbers
- Competency 1.2.5: Set up, solve, and apply ratios and proportions
- Competency 1.2.6: Solve problems and make applications involving integers, fractions, decimals, percentages, ratios, and proportions
- Competency 1.2.7: Translate written and/or verbal statements into mathematical expressions
- Competency 1.2.8: Estimate answers

* Advancing ** Futuring



Unit 2: Measurement

Subunit 2.2: Group B

- Competency 2.2.1: Convert, compare, and compute with common units of measurement within and/or across measurement systems
- Competency 2.2.2: Compute using appropriate units of measurement
- Competency 2.2.3: Read scale on measurement device(s) to nearest mark
 - and make interpolations where appropriate
- Competency 2.2.4: Estimate measurements

Unit 3: Data Analysis and Probability

Subunit 3.2: Group B

- Competency 3.2.1: Interpret and use tables, charts, maps, and/or graphs
- Competency 3.2.2: Identify patterns, note trends, and/or draw
 - conclusions from tables, charts, maps, and/or graphs
- Competency 3.2.3: Collect and organize data into tables, charts, and/or graphs
- Competency 3.2.4: Compute and interpret mean, median, and/or mode
- Competency 3.2.5: Use elementary notions of probability
- Competency 3.2.6: Use problem-solving techniques

Unit 4: Algebra

Subunit 4.2: Group B

- Competency 4.2.1: Evaluate and/or simplify algebraic expressions using simple substitutions
- Competency 4.2.2: Solve linear equations
- Competency 4.2.3: Use order of operations to solve problems
- Competency 4.2.4: Use formulas
- Competency 4.2.5: Use properties of exponents
- Competency 4.2.6: Determine slope, midpoint, and distance



Unit 5: Geometry Subunit 5.2: Group B

Competency 5.2.1: Find perimeters and areas of geometric figures

Find surface areas and volumes of applicable Competency 5.2.2:

geometric figures

Recognize, classify, and use properties of lines and Competency 5.2.3:

angles

Recognize, classify, and use properties of two- and three-dimensional figures (e.g., circles, triangles, Competency 5.2.4:

rectangles, cylinders)

Competency 5.2.5: Apply problem solving to geometric figures

Competency 5.2.6: Apply Pythagorean theorem*



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Natural Resources
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Resource Conservation
Turf and Landscape Worker

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Agricultural Business Feed and Grain Worker Agricultural Production Agricultural Products Sales and Service Worker Animal Management Technician Fertilizer/Chemical Sales and Service Worker Floriculture and Greenhouse Worker

Forest Industry Worker
Horticulture
Natural Resources
Nursery and Garden Center Worker
Resource Conservation
Turf and Landscape Worker

	Mathematics OCAP	UNIT 1: NUMBERS AND NUMBER RELATIONS	1.2.1	1.2.2	1.2.3	1.2.4	1.2.5	1.2.6	1.2.7	1.2.8	UNIT 2: MEASUREMENT	2.2.1	2.2.2	2.2.3	2.2.4	UNIT 3: DATA ANALYSIS AND PROBABILITY	3.2.1	3.2.2	3.2.3	3.2.4	3.2.5	3.2.6
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Ohio Competency Analysis Profile **Mathematics**

for

Agricultural/Industrial Mechanical Technician Auto Collision Technician Auto Mechanics Diesel Mechanics Power Equipment Technology

Unit 1: Numbers and Number Relations

Subunit 1.3: Group C

- Competency 1.3.1: Round and/or truncate numbers to designated place value
- Competency 1.3.2: Compute and solve problems involving integers, fractions, decimals, and percentages using order of operations
- Compare, order, and determine equivalence of real Competency 1.3.3: numbers (e.g., fractions, decimals, percentages)
- Estimate, apply, and solve problems involving Competency 1.3.4: fractions, decimals, percentages, and real numbers
- Set up, solve, and apply ratios and proportions Competency 1.3.5:
- Solve problems and make applications involving Competency 1.3.6: integers, fractions, decimals, percentages, ratios, and proportions
- Translate written and/or verbal statements into Competency 1.3.7: mathematical expressions
- Competency 1.3.8: Estimate answers



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Unit 2: Measurement

Subunit 2.3: Group C

Competency 2.3.1: Convert, compare, and compute with common units of measurement within and/or across measurement

systems

- Competency 2.3.2: Compute using appropriate units of measurement
- Competency 2.3.3: Read scale on measurement device(s) to nearest mark and make interpolations where appropriate

Competency 2.3.4: Estimate measurements

Unit 3: Data Analysis and Probability

Subunit 3.3: Group C

- Competency 3.3.1: Interpret and use tables, charts, maps, and/or graphs
- Competency 3.3.2: Identify patterns, note trends, and/or draw

conclusions from tables, charts, maps, and/or graphs

Competency 3.3.3: Collect and organize data into tables, charts, and/or

graphs

- Competency 3.3.4: Compute and interpret mean, median, and/or mode
- Competency 3.3.5: Use elementary notions of probability

Competency 3.3.6: Use problem-solving techniques

Unit 4: Algebra

Subunit 4.3: Group C

- Competency 4.3.1: Evaluate and/or simplify algebraic expressions using simple substitutions
- Competency 4.3.2: Solve linear equations
- Competency 4.3.3: Use order of operations to solve problems
- Competency 4.3.4: Use formulas
- Competency 4.3.5: Determine slope, midpoint, and distance*
- Competency 4.3.6: Graph linear functions*



Unit 5: Geometry Subunit 5.3: Group C

Competency 5.3.1: Find perimeters and areas of geometric figures

Competency 5.3.2: Find surface areas and volumes of applicable

geometric figures

Competency 5.3.3: Recognize, classify, and use properties of lines and angles

Competency 5.3.4: Recognize, classify, and use properties of two- and three-dimensional figures (e.g., circles, triangles,

rectangles, cylinders)

Competency 5.3.5: Apply Pythagorean theorem*

Competency 5.3.6: Describe and apply properties of similar and/or congruent figures*



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Agricultural/Industrial Mechanical Technician Auto Collision Technician Auto Mechanics Diesel Mechanics Power Equipment Technology

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Refer to pages 78-81 for Ohio Model Competency-Based Mathematics Program codes.

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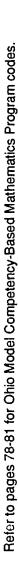
Refer to pages 78-81 for Ohio Model Competency-Based Mathematics Program codes.



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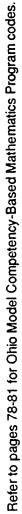


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Ohio Competency Analysis Profile Mathematics

for

Building and Property Maintenance
Carpentry
Heating, Ventilation, Air-Conditioning, and Refrigeration
Masonry
Welding

Unit 1: Numbers and Number Relations

Subunit 1.4: Group D

- Competency 1.4.1: Round and/or truncate numbers to designated place value
- Competency 1.4.2: Compute and solve problems involving integers, fractions, decimals, and percentages using order of operations
- Competency 1.4.3: Compare, order, and determine equivalence of real numbers (e.g., fractions, decimals, percentages)
- Competency 1.4.4: Estimate, apply, and solve problems involving fractions, decimals, percentages, and real numbers
- Competency 1.4.5: Set up, solve, and apply ratios and proportions
- Competency 1.4.6: Solve problems and make applications involving integers, fractions, decimals, percentages, ratios, and proportions
- Competency 1.4.7: Translate written and/or verbal statements into mathematical expressions
- Competency 1.4.8: Estimate answers



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Unit 2: Measurement

Subunit 2.4: Group D

Competency 2.4.1: Convert, compare, and compute with common units of

measurement within and/or across measurement

systems

Competency 2.4.2: Compute using appropriate units of measurement

Competency 2.4.3: Read scale on measurement device(s) to nearest mark

and make interpolations where appropriate

Competency 2.4.4: Estimate measurements

Unit 3: Data Analysis and Probability

Subunit 3.4: Group D

- Competency 3.4.1: Interpret and use tables, charts, maps, and/or graphs
- Competency 3.4.2: Identify patterns, note trends, and/or draw

conclusions from tables, charts, maps, and/or graphs

Competency 3.4.3: Collect and organize data into tables, charts, and/or

graphs

- Competency 3.4.4: Compute and interpret mean, median, and/or mode
- Competency 3.4.5: Use elementary notions of probability
- Competency 3.4.6: Use problem-solving techniques

Unit 4: Algebra

Subunit 4.4: Group D

Competency 4.4.1: Evaluate and/or simplify algebraic expressions using

simple substitutions

- Competency 4.4.2: Solve linear equations
- Competency 4.4.3: Use order of operations to solve problems
- Competency 4.4.4: Use formulas





^{*} Advancing ** Futuring

Unit 5: Geometry Subunit 5.4: Group D

Competency 5.4.1: Find perimeters and areas of geometric figures

Find surface areas and volumes of applicable Competency 5.4.2:

geometric figures

Recognize, classify, and use properties of lines and Competency 5.4.3:

angles

Recognize, classify, and use properties of two- and three-dimensional figures (e.g., circles, triangles, Competency 5.4.4:

rectangles, cylinders)

Competency 5.4.5: Apply problem solving to geometric figures

Competency 5.4.6: Apply Pythagorean theorem



Carpentry Heating, Ventilation, Air-Conditioning, and Refrigeration Masonry Welding Building and Property Maintenance

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Building and Property Maintenance Carpentry Heating, Ventilation, Air-Conditioning, and Refrigeration Masonry Welding

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Refer to pages 78-81 for Ohio Model Competency-Based Mathematics Program codes.



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Building and Property Maintenance Carpentry Heating, Ventilation, Air-Conditioning, and Refrigeration Masonry Welding

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Carpentry Heating, Ventilation, Air-Conditioning, and Refrigeration Building and Property Maintenance Masonry Welding

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Ohio Competency Analysis Profile Mathematics

for

Dental Assistant
Diversified Health Occupations
Medical Assistant
Nurse Aide
Practical Nursing

Unit 1: Numbers and Number Relations Subunit 1.5: Group E

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Competency	1.5.1:	Round and/or truncate numbers to designated place value
Competency	1.5.2:	Compute and solve problems involving integers, fractions, decimals, and percentages using order of operations
Competency	1.5.3:	Compare, order, and determine equivalence of real numbers (e.g., fractions, decimals, percentages)
Competency	1.5.4:	Estimate, apply, and solve problems involving fractions, decimals, percentages, and real numbers
Competency	1.5.5:	Set up, solve, and apply ratios and proportions
Competency	1.5.6:	Solve problems and make applications involving integers, fractions, decimals, percentages, ratios, and proportions
Competency	1.5.7:	Translate written and/or verbal statements into mathematical expressions
Competency	1.5.8:	Estimate answers
Competency	1.5.9:	Convert between Arabic and Roman numerals
Competency	1.5.10:	Set up problems involving rational numbers



Ex

Unit 2: Measurement

Subunit 2.5: Group E

Competency 2.5.1: Convert, compare, and compute with common units of

measurement within and/or across measurement

systems

Competency 2.5.2: Compute using appropriate units of measurement

Competency 2.5.3: Read scale on measurement device(s) to nearest mark

and make interpolations where appropriate

Competency 2.5.4: Estimate measurements

Unit 3: Data Analysis and Probability

Subunit 3.5: Group E

- Competency 3.5.1: Interpret and use tables, charts, maps, and/or graphs
- Competency 3.5.2: Identify patterns, note trends, and/or draw

conclusions from tables, charts, maps, and/or graphs

Competency 3.5.3: Collect and organize data into tables, charts, and/or

graphs

- Competency 3.5.4: Compute and interpret mean, median, and/or mode
- Competency 3.5.5: Use elementary notions of probability

Competency 3.5.6: Use problem-solving techniques

Unit 4: Algebra

Subunit 4.5: Group E

Competency 4.5.1: Evaluate and/or simplify algebraic expressions using

simple substitutions

Competency 4.5.2: Solve linear equations

Competency 4.5.3: Use order of operations to solve problems

Competency 4.5.4: Use formulas





Unit 5: Geometry Subunit 5.5: Group E

Competency 5.5.1: Find perimeters and areas of geometric figures

Competency 5.5.2: Find surface areas and volumes of applicable geometric figures

Competency 5.5.3: Recognize, classify, and use properties of lines and

angles

Recognize, classify, and use properties of two- and three-dimensional figures (e.g., circles, triangles, Competency 5.5.4:

rectangles, cylinders)



Dental Assistant Diversified Health Occupations Medical Assistant Nurse Aidle Practical Nursing

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Practical Nursing

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Refer to pages 78-81 for Ohio Model Competency-Based Mathematics Program codes.

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Refer to pages 78-81 for Ohio Model Competency-Based Mathematics Program codes.

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Refer to pages 78-81 for Ohio Model Competency-Based Mathematics Program codes.

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Ohio Competency Analysis Profile Mathematics

for

Clothing and Interiors, Production and Services

Cosmetology

Early Childhood Education and Care

Food Production, Management, and Services

Hospitality and Facility Care Services

Meat Processor

Unit 1: Numbers and Number Relations Subunit 1.6: Group F

- Competency 1.6.1: Round and/or truncate numbers to designated place value
- Competency 1.6.2: Compute and solve problems involving integers, fractions, decimals, and percentages using order of operations
- Competency 1.6.3: Compare, order, and determine equivalence of real numbers (e.g., fractions, decimals, percentages)
- Competency 1.6.4: Estimate, apply, and solve problems involving fractions, decimals, percentages, and real numbers
- Competency 1.6.5: Set up, solve, and apply ratios and proportions
- Competency 1.6.6: Solve problems and make applications involving integers, fractions, decimals, percentages, ratios, and proportions
- Competency 1.6.7: Translate written and/or verbal statements into mathematical expressions
- Competency 1.6.8: Estimate answers



Unit 2: Measurement

Subunit 2.6: Group F

Competency 2.6.1: Convert, compare, and compute with common units of

measurement within and/or across measurement

systems

Competency 2.6.2: Compute using appropriate units of measurement

Competency 2.6.3: Read scale on measurement device(s) to nearest mark

and make interpolations where appropriate

Competency 2.6.4: Estimate measurements

Unit 3: Data Analysis and Probability

Subunit 3.6: Group F

Competency 3.6.1: Interpret and use tables, charts, maps, and/or graphs

Competency 3.6.2: Identify patterns, note trends, and/or draw

conclusions from tables, charts, maps, and/or graphs

Competency 3.6.3: Collect and organize data into tables, charts, and/or

graphs

Competency 3.6.4: Compute and interpret mean, median, and/or mode

Competency 3.6.5: Use elementary notions of probability

Competency 3.6.6: Use problem-solving techniques

Unit 4: Algebra

Subunit 4.6: Group F

Competency 4.6.1: Evaluate and/or simplify algebraic expressions using

simple substitutions

Competency 4.6.2: Solve linear equations

Competency 4.6.3: Use order of operations to solve problems

Competency 4.6.4: Use formulas





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Unit 5: Geometry Subunit 5.6: Group F

Competency 5.6.1: Find perimeters and areas of geometric figures

Competency 5.6.2: Find surface areas and volumes of applicable

geometric figures

Competency 5.6.3: Recognize, classify, and use properties of lines and

angles

Recognize, classify, and use properties of two- and three-dimensional figures (e.g., circles, triangles, rectangles, cylinders) Competency 5.6.4:

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Refer to pages 78-81 for Ohio Model Competency-Based Mathematics Program codes.

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Refer to pages 78-81 for Ohio Model Competency-Based Mathematics Program codes.



Clothing and Interiors, Production and Services
Cosmetology
Early Childhood Education and Care
Food Production, Management, and Services
Hospitality and Facility Care Services
Meat Processor

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Ohio Competency Analysis Profile Mathematics

for

Commercial Art
Graphic Communications: Commercial Photography
Graphic Communications: Graphic Arts

Unit 1: Numbers and Number Relations

Subunit 1.7: Group G

Competency 1.7.1: Round and/or truncate numbers to designated place

value

Competency 1.7.2: Compute and solve problems involving integers,

fractions, decimals, and percentages using order of

operations

Competency 1.7.3: Compare, order, and determine equivalence of real

numbers (e.g., fractions, decimals, percentages)

Competency 1.7.4: Estimate, apply, and solve problems involving

fractions, decimals, percentages, and real numbers

Competency 1.7.5: Set up, solve, and apply ratios and proportions

Competency 1.7.6: Solve problems and make applications involving

integers, fractions, decimals, percentages, ratios, and

proportions

Competency 1.7.7: Translate written and/or verbal statements into

mathematical expressions

Competency 1.7.8: Estimate answers

Unit 2: Measurement

Subunit 2.7: Group G

Competency 2.7.1: Convert, compare, and compute with common units of

measurement within and/or across measurement

systems

Competency 2.7.2: Compute using appropriate units of measurement

Competency 2.7.3: Read scale on measurement device(s) to nearest mark

60

and make interpolations where appropriate

Competency 2.7.4: Estimate measurements



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Unit 3: Data Analysis and Probability

Subunit 3.7: Group G

- Competency 3.7.1: Interpret and use tables, charts, maps, and/or graphs
- Competency 3.7.2: Identify patterns, note trends, and/or draw

conclusions from tables, charts, maps, and/or graphs

Competency 3.7.3: Collect and organize data into tables, charts, and/or

graphs

- Competency 3.7.4: Compute and interpret mean, median, and/or mode
- Competency 3.7.5: Use elementary notions of probability
- Competency 3.7.6: Use problem-solving techniques

Unit 4: Algebra

Subunit 4.7: Group G

Competency 4.7.1: Evaluate and/or simplify algebraic expressions using

simple substitutions

- Competency 4.7.2: Solve linear equations
- Competency 4.7.3: Use order of operations to solve problems
- Competency 4.7.4: Use formulas

Unit 5: Geometry

subunit 5.7: Group G

- Competency 5.7.1: Find perimeters and areas of geometric figures
- Competency 5.7.2: Find surface areas and volumes of applicable geometric figures
- Competency 5.7.3: Recognize, classify, and use properties of lines and angles
- Competency 5.7.4: Recognize, classify, and use properties of two- and three-dimensional figures (e.g., circles, triangles,

rectangles, cylinders)

Competency 5.7.5: Describe and apply properties of similar and

congruent figures



* Advancing ** Futuring

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Refer to pages 78-81 for Ohio Model Competency-Based Mathematics Program codes.



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Commercial Art Graphic Communications: Commercial Photography Graphic Communications: Graphic Arts

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Refer to pages 78-81 for Ohio Model Competency-Based Mathematics Program codes.

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Commercial Art Graphic Communications: Commercial Photography Graphic Communications: Graphic Arts

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Ohio Competency Analysis Profile Mathematics

for

Drafting
Electrical Trades
Electronics
Industrial Maintenance
Machine Trades

Unit 1: Numbers and Number Relations

Subunit 1.8: Group H

- Competency 1.8.1: Round and/or truncate numbers to designated place value
- Competency 1.8.2: Compute and solve problems involving integers, fractions, decimals, and percentages using order of operations
- Competency 1.8.3: Compare, order, and determine equivalence of real numbers (e.g., fractions, decimals, percentages)
- Competency 1.8.4: Estimate, apply, and solve problems involving fractions, decimals, percentages, and real numbers
- Competency 1.8.5: Set up, solve, and apply ratios and proportions
- Competency 1.8.6: Solve problems and make applications involving integers, fractions, decimals, percentages, ratios, and proportions
- Competency 1.8.7: Translate written and/or verbal statements into mathematical expressions
- Competency 1.8.8: Estimate answers
- Competency 1.8.9: Compare, compute, and solve problems involving binary, octal, decimal, and hexadecimal numbering systems (Electronics Only)



Unit 2: Measurement

Subunit 2.8: Group H

Competency 2.8.1: Convert, compare, and compute with common units of

measurement within and/or across measurement

systems

- Competency 2.8.2: Compute using appropriate units of measurement
- Competency 2.8.3: Read scale on measurement device(s) to nearest mark

and make interpolations where appropriate

Competency 2.8.4: Estimate measurements

Unit 3: Data Analysis and Probability

Subunit 3.8: Group H

- Competency 3.8.1: Interpret and use tables, charts, maps, and/or graphs
- Competency 3.8.2: Identify patterns, note trends, and/or draw

conclusions from tables, charts, maps, and/or graphs

Competency 3.8.3: Collect and organize data into tables, charts, and/or graphs

Competency 3.8.4: Compute and interpret mean, median, and/or mode

Competency 3.8.5: Use elementary notions of probability

Competency 3.8.6: Use problem-solving techniques

Unit 4: Algebra

Subunit 4.8: Group H

Competency 4.8.1: Evaluate and/or simplify algebraic expressions using

simple substitutions

- Competency 4.8.2: Solve linear equations
- Competency 4.8.3: Use order of operations to solve problems

Competency 4.8.4: Use formulas

Competency 4.8.5: Compare and compute using scientific notation

Competency 4.8.6: Use properties of exponents

Competency 4.8.7: Select and use appropriate problem-solving

techniques

Competency 4.8.8: Determine slope, midpoint, and distance (Not

Electronics)

- Competency 4.8.9: Graph functions
- Competency 4.8.10: Use Boolean algebra (Electronics Only)



^{*} Advancing ** Futuring

Unit 5: Geometry Subunit 5.8: Group H

Competency 5.8.1: Find perimeters and areas of geometric figures

Competency 5.8.2: Find surface areas and volumes of applicable

geometric figures

Competency 5.8.3: Recognize, classify, and use properties of lines and

angles

Competency 5.8.4: Recognize, classify, and use properties of two- and

three-dimensional figures (e.g., circles, triangles,

rectangles, cylinders)

Competency 5.8.5: Apply Pythagorean theorem

Competency 5.8.6: Describe and apply properties of similar and

congruent figures (Not Electronics)

Unit 6: Trigonometry

Competency 6.0.1: Identify basic functions of sine, cosine, and tangent

Competency 6.0.2: Compute and solve problems using basic

trigonometric functions

Competency 6.0.3: Graph basic functions using polar and/or Cartesian

coordinate systems





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	Mathematics OCAP	UNIT 4: ALGEBRA	4.8.1	4.8.2	4.8.3	4.8.4	4.8.5	4.8.6	4.8.7	4.8.8	4.8.9	4.8.10	UNIT 5: GEOMETRY	5.8.1	5.8.2	5.8.3	5.8.4	5.8.5	5.8.6	UNIT 6: TRIGONOMETRY	6.8.1	6.8.2	6.8.3
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Refer to pages 78-81 for Ohio Competency-Based Mathematics Program codes.



Ohio Model Competency-Based Mathematics Program

PSS=Problem-Solving Strategies
NR=Numbers and Number Relations
M=Measurement
E=Estimation and Mental Computation
D=Data Analysis and Probability

A=Algebra G=Geometry

P=Patterns, Relations, and Functions

Problem-Solving Strategies

Numbers and Number Relations

- NR1 Compare, order, and determine equivalence of real numbers
- NR2 Estimate answers, compute, and solve problems involving real numbers
- NR3 Compare and contrast real number system, rational number system, and whole number system
- NR4 Extend understanding to complex number system and develop facility with its operation

Measurement

- M1 Estimate and use measurements
- M2 Understand need for measurement and probability that any measurement is accurate to some designated specification
- M3 Understand and apply measurements related to power and work
- M4 Understand and apply measurement concepts of distance-rate-time problems and acceleration problems
- M5 Use real experiments to investigate elasticity, heat, sound, electricity, magnetism, light, acceleration, velocity, energy, and gravity
- M6 Use real-world problem situations involving mass and weight
- M7 Use real-world problem situations involving simple harmonic motion
- M8 Establish ratios with and without common units
- M9 Construct and interpret maps, tables, charts, and graphs as they relate to real-world mathematics
- M10 Understand and solve rate-change problems
- M11 Understand and solve right triangle relationships as they relate to measurement, specifically to Pythagorean theorem
- M12 Graph and interpret ordered pairs
- M13 Compute total sales from a variety of items
- M14 Comprehend and compute rates of growth or decay
- M15 Comprehend, compute, and interpret real problems involving annuities
 M16 Develop an ability to identify real problems and provide possible solutions
- M17 Express and apply different types of measurement scales
- M18 Determine area and volume



Estimation and Mental Computation

- El Use estimation to eliminate choices in multiple-choice tests
- E2 Use estimation to determine reasonableness of problem situations in a wide variety of applications
- E3 Estimate shape of graphs of various functions and algebraic expressions
- E4 Use mental computation when computer and calculator are inappropriate

Data Analysis and Probability

- D1 Organize data into tables, charts, and graphs
- D2 Understand and apply measures of central tendency, variability, and correlation
- D3 Use curve fitting to predict from data
- Use experimental or theoretical probability, as appropriate, to represent and solve problems involving uncertainty
- D5 Use computer simulations and random number generators to estimate probabilities
- D6 Test hypotheses using appropriate statistics
- D7 Read, interpret, and use tables, charts, and graphs to identify patterns, note trends, draw conclusions, and make predictions
- D8 Determine probabilities of events involving unbiased objects
- D9 Use sampling and recognize its role in statistical claims
- D10 Design a statistical experiment to study problem, conduct experiment, and interpret and communicate outcomes
- D11 Describe normal curve in general terms and use its properties
- D12 Create and interpret discrete probability distributions
- D13 Understand concept of random variable
- Apply concept of random variable to generate and interpret probability distributions, including binomial, uniform, normal, and chi square

Algebra

- Al Describe problem situations by using and relating numerical, symbolic, and graphical representations
- A2 Use language and notation of functions in symbolic and graphing settings
- A3 Recognize and use equivalent zeros of a function, roots and the solution of an equation in terms of graphical and symbolic representations
- A4 Describe and use logic of equivalence in working with equations, inequalities, and functions
- A5 Develop graphical techniques of solution for problem situations involving functions
- A6 Explore and describe characterizing features of functions
- A7 Make arguments and proofs in algebraic settings
- A8 Factor difference of two squares
- A9 Determine slot, midpoint, and distance
- A10 Explore and combine rational functions
- All Explore factoring techniques
- A12 Solve quadratic equations by factoring and formula
- A13 Set up and solve linear equations
- A14 Solve systems of linear equations with two variables
- A15 Describe geometric situations and phenomena using variables, equations, and functions

- A16 Describe measures of central tendency, mean, median, mode, and variance algebraically and graphically
- A17 Represent inequalities on number line and in coordinate plane



Mathematics--8/92

A18	Use coordinate arguments in making geometric proofs
A19	Symbolize transformations of figures and graphs
A20	Explore geometric basis for functions of trigonometry
A21	Graph linear functions
A22	Develop and use vectors to represent direction and magnitude including operations
A23	Use no ar and parametric equations to describe, graph, and solve problem situations
A24	Represent sequences and series as functions both algebraically and graphically
A25	Explore recursive functions and procedures using spreadsheets, other computer
	utilities, and appropriate notions
A26	Describe and solve algebraic situations with matrices
A27	Describe and use inverse relationship between functions including exponential and
	logarithmic
A28	Analyze and describe errors and error sources that can be made when using
	computers and calculators to solve problems
A29	Decide whether problem situation is best solved using computer, calculator, paper
	and pencil, or mental arithmetic/estimation techniques
A30	Explore relationships between complex numbers and vectors
A31	Make arguments concerning limits, convergence and divergence in context
	involving sequences, series, and other types of functions
A32	Represent transformations in plane with matrices
A33	Contrast and compare algebras of rational, real, and complex numbers with
	characteristics of a matrix algebra system
A34	Construct polynomial approximations of a function over specified intervals of
	convergence
A35	Examine complex numbers as zeros of functions
A36	Translate verbal statements into symbolic language
A37	Simplify algebraic expressions
A38	Use laws and exponents (including scientific notation)
A39	Expand and extend idea of vectors and linear algebra to higher dimensional
	situations
A40	Use the idea of independent basis elements for a vector space and associated
	fundamental concepts of finite dimensional linear algebra
A41	Develop and communicate arguments about limit situations
A42	Use matrices to describe and apply transformations
A43	Develop and use polar and parametric equations to represent problem situations
A44	Explore proofs by mathematical induction
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Geometry

- Create and interpret drawings of three-dimensional objects G1
- Represent problem situations with geometric models and apply properties of figures G2
- Apply Pythagorean theorem G3
- Demonstrate understanding of angles and parallel and perpendicular lines G4
- Explore inductive and deductive reasoning through applications to various subject G5 areas
- Translate between synthetic and coordinate representations **G**6
- Identify congruent and similar figures using transformations with computer **G7** programs
- Deduce properties of figures using transformations and coordinates G8
- Use deductive reasoning G9
- Explore compass and straightedge constructions in context of geometric theorems G10
- Demonstrate understanding of and ability to use proof G11
- Use variety of proof techniques (e.g., synthetic, transformational, and coordinate) G12



G13 Use variety of proof formats, including T-proof (i.e., two-column) and paragraph G14

Explore different proof strategies

G15 Investigate different proofs of theorems

G16 Develop understanding of an axiomatic system Apply transformations and coordinates in problem solving G17

G18 Represent problem situations with geometric models and apply properties of figures

G19 Deduce properties of figures using vectors

G20 Analyze properties of Euclidian transformations and relate translations to vectors

G21 Apply vectors in problem solving

G22 Develop further understanding of axiomatic systems by investigating and comparing various geometries

Patterns, Relations, and Functions

- P1 Model real-world phenomena with polynomial and exponential functions
- **P2** Explore relationship between zeros and intercepts of functions
- **P3** Translate among tables, algebraic expressions, and graphs of functions
- **P4** Use graphing calculator or computer to generate graph of a function
- **P5** Explore relationship between a linear function and its inverse
- **P6** Describe and use characteristics of polynomial functions in problem-solving situations
- **P7** Explore conic sections and graph using graphing calculator or computer
- P8 Apply trigonometric functions to problem situations involving triangles
- P9 Discover relationships between algebraic description, kind, and properties of conic
- P10 Explore periodic real-world phenomena using sine and cosine functions
- P11 Analyze effects of parameter changes on graphs
- P12 Use graphing calculator or computer to graph functions
- P13 Develop an understanding of rational and transcendental functions
- P14 Understand connections between trigonometric and circular functions
- P15 Use circular functions to model periodic real-world functions
- P16 Solve trigonometric equations and verify trigonometric identities
- P17 Understand connections between trigonometric, exponential, and logarithmic functions and polar coordinates, complex numbers, and series
- P18 Model real-world phenomena with a variety of functions
- P19 Graph using polar coordinates
- P20 Explore graphs in three dimensions
- Explore functions of several variables P21
- P22 Explore recursive functions using spreadsheets and/or programming languages



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